REMARKS

These remarks and the accompanying amendments are responsive to the Office Action dated October 4, 2006 (hereinafter referred to as the "Office Action"). At the time of the last examination, Claims 7-10 were pending, of which Claims 7 and 9 are independent. The Office Action rejected Claims 7-10 under 35 U.S.C. 103(a) as being unpatentable over United States patent serial number 6,212,176 issued to Andersson (the patent hereinafter referred to simply as "Andersson").

In this response, an attached appendix that includes four figures (Figures 1-4) is used to order to show the unique differences of the mapping solution claimed in Claims 7-10. First, a simple solution (hereinafter "the simple solution") is explained for mapping a logical channel into a physical channel with respect to Figures 1 and 2. Then, an example of the mapping solution of Claims 7-10 is explained with respect to Figures 3 and 4. The advantages of the mapping solution of Claims 7-10 as compared to the simple solution will then be explained. Although the simple solution is not prior art, its understanding should help in an understanding of the unique and inventive solution offered by the mapping solution of Claims 7-10.

Simple Solution

1) We first explain the simple solution for mapping a logical channel into a physical channel. Although this solution is a simple one, it is not disclosed in Andersson. Further, it seems that this solution is not even prior art.

2) In explaining the simple solution, we consider an example of Figure 1 of the attached appendix in which the logical channel is mapped into the physical channel whose transmission rate is 256 bits/frame. The information of the logical channel and the the physical channel are shown in Figures 1(a) and 1(b), respectively.

In order to map the logical channel into the physical channel, the information of the logical channel is first divided into segments.

The simple solution for dividing the information of logical channel into segments is to divide the information of logical channel into segments such that each segment can be mapped into a single frame on the physical channel. According to this simple solution, in the example of Figure 1 of the attached appendix, the information of logical channel is divided into segments each of which has 256-16 = 240 bits (please see Figure 1(i)). Here, 256 bits are the number of bits of a single frame, and 16 bits are the number of bits of the error detecting code (in this explanation, we use CRC as the error detecting code) which will be added to each information segment.

Then, the CRC data is added to each information segment to form each logical channel unit (please see Figure 1(ii) of the attached appendix).

Then, the logical channel is mapped into the physical channel (please see Reference Figure 1(iii) of the attached appendix). That is, each logical channel unit is mapped into a single frame on the physical channel.

3) Secondly, we consider an example of Figure 2 of the attached appendix in which the logical channel is mapped into the physical channel whose transmission rate is 128 bits/frame. This rate is lower than that of Figure 1 (256 bits/frame). The information of the logical channel and the physical channel are shown in Figure 2(a) and 2(b), respectively, of the attached appendix.

In order to map the logical channel into the physical channel, the information of logical channel is first divided into segments. In the example of Figure 2 of the attached appendix, the information of logical channel is divided into segments each of which has 128-16 = 112 bits

(please see Reference Figure 2(i) of the attached appendix). Here, 128 bits are the number of bits of a single frame, and 16 bits are the number of bits of CRC which will be added to each information segment. It is usual that the number of bits of CRC does not change, even if the number of bits of information changes.

Then, the CRC data is added to each information segment to form each logical channel unit (please see Reference Figure 2(ii) of the attached appendix).

Then, the logical channel is mapped into the physical channel (please see Figure 2(iii) of the attached appendix). That is, each logical channel unit is mapped into a single frame on the physical channel.

4) According to this simple solution, even if the transmission rate of the physical channel is low (as is the case for Figure 2 of the attached appendix), a single logical channel unit is still always mapped into a single frame on the physical channel. That is, contrary to claims 7-10, the number of frames on the physical channel into which each logical unit is mapped is not changed, even if the transmission rate of the physical channel is low.

In this simple solution, since CRC is added to each single frame, it is possible to maintain the rate of error detection per unit time to secure the communication quality.

Solution of claims 7-10 and its advantage

1) In the solution of claims 7-10, the logical channel is mapped into the physical channel such that the number of frames on the physical channel into which each logical channel unit is mapped is larger when the transmission rate of the physical channel is lower.

According to the solution of claims 7-10, for example, the mapping can be conducted as shown in Figures 3 and 4 of the attached appendix. The example of Figures 3 and 4 is simple one example of numerous embodiments that fall within the scope of Claims 7-10. However, the

example of Figures 3 and 4 are reasonable examples of the broader principles of the present invention.

In Figure 3, the logical channel is mapped into the physical channel whose transmission rate is 256 bits/frame, while in Figure 4, the logical channel is mapped into the physical channel whose transmission rate is 128 bits/frame.

In Figure 3, the number of frames on the physical channel into which each logical unit is mapped is one, while in Figure 4, the number of frames on the physical channel into which each logical unit is mapped is two. Consistent with this example, the solution of claims 7-10 conducts mapping such that the number of frames on the physical channel into which each logical channel unit is mapped is larger when the transmission rate of the physical channel is lower.

2) The mapping of Figure 3 of the attached appendix is the same as that of Reference Figure 1.

3) Thus, next, we consider the mapping of Figure 4 of the attached appendix. The information of logical channel and the physical channel are shown in Figures 4(a) and 4(b), respectively, of the attached appendix.

In order to map the logical channel into the physical channel, the information of logical channel is first divided into segments. In the example of Figure 4 of the attached appendix, the information of logical channel is divided into segments each of which has 128+128-16 = 240 bits (please see Figure 4(i) of the attached appendix). Here, 128+128 = 256 bits are the number of bits of two frames. As we explained above, in Reference Figure 4, the number of frames into which each logical unit is mapped is two. 16 bits are the number of bits of CRC which will be added to each information segment.

Then, the CRC data is added to each information segment to form each logical channel unit (please see Figure 4(ii) of the attached appendix).

Then, the logical channel is mapped into the physical channel (please see Figure 4(iii) of the attached appendix). That is, each logical channel unit is mapped into two frames on the physical channel.

4) Advantage of solution of claims 7-10

The above-mentioned simple solution has a disadvantage that the ratio of CRC to information is high, when the transmission rate of the physical channel is low. That is, in Figure 1 (256 bits/frame), the ratio of CRC to information is 16/240 = 0.067, while in Reference Figure 2 (128 bits/frame), the ratio of CRC to information is 16/112 = 0.14. If the ratio of CRC to information is higher, the amount of information that can be transmitted is smaller, and therefore the transmission efficiency is lower.

Meanwhile, the solution of claims 7-10 has an advantage that it suppresses increase of the ratio of CRC data to information, when the transmission rate of the physical channel is lower. For example, in Figure 3 (256 bits/frame), the ratio of CRC to information is 16/240 = 0.067, while in Figure 4 (128 bits/frame), the ratio of CRC to information is still 16/240 = 0.067. Thus, the solution of claims 7-10 can accomplish efficient transmission.

2 Non-obviousness of claims 7-10

Claim 7 has the following four elements (a)-(d).

(a) A communication apparatus comprising:

(b) means for forming logical channel units each of which is to be subjected to error detection, each logical channel unit including information of a logical channel and an error detecting code added to the information;

(c) means for mapping the logical channel into a physical channel such that a number of radio frames of a fixed duration on the physical channel into which each logical channel unit is mapped increases as a transmission rate of the physical channel decreases; and

(d) means for transmitting a signal of the logical channel over the physical channel.

At page 3, lines 3-11 of the Office Action, the Office Action states that the elements (a), (b) and (d) are disclosed in Andersson, while Andersson fails to disclose the element (c). Then, at page 3, lines 12-15 of the Office Action, the Office Action states that "since each slot can carry less amount of information when the transmission rate of the physical channel is lowered, it would have been obvious to one skilled in the art increase the number of time slots in order to ensure the same amount of data to be transmitted per logical channel".

Similarly, the Examiner rejects claims 8-10.

However, in connection with the element (c), there are at least two solutions for the mapping: the simple solution and the solution of claims 7-10, as we explained above.

When we compare the solution of claims 7-10 with the simple solution, we believe that the solution of claims 7-10 is not obvious over the simple solution, since the solution of claims 7-10 has the advantage, as we explained above.

Here, this simple solution is not disclosed in Andersson cited in the current Office Action. Further, it seems that this simple solution is not even prior art.

Since the solution of claims 7-10 is not obvious over the simple solution which is not prior art, it is clear that the solution of claims 7-10 is not obvious over prior art (including Andersson).

Accordingly, favorable action is respectfully requested. In the event that the Examiner finds remaining impediment to a prompt allowance of this application that may be clarified through a telephone interview, the Examiner is requested to contact the undersigned attorney.

Dated this 13th day of June, 2007.

Respectfully submitted,

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